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WO 94/21879 A1 US 4555829 A

(58) Field of Search
UK CL (Edition N) E2F FSG
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Online: WPI

(54) Friction window stay

(57) A friction window stay for mounting a window sash in a window frame, such as a four bar friction window stay, has a long arm 2, a short arm 1, a frame mounting member 3 for securing to the frame of a window and a sash mounting member 6 for securing to the sash of the window. The long arm-frame mounting member pivot joint 5 is mounted for sliding or travelling movement along the frame mounting member 3 sufficiently to allow the stay to open to in excess of 90 degrees between the sash and frame mounting members, and a link arm 1 is pivotally connected between the frame mounting member 3 and long arm 2 at positions on the frame mounting member and long arm such that the link arm is not opened to an angle to the frame mounting member greater than 90 degrees when the stay is fully opened to in excess of 90 degrees. The pivot joint between the short arm 1 and member 3 may be a geared pivotal connection (9, 10 Figure 4).

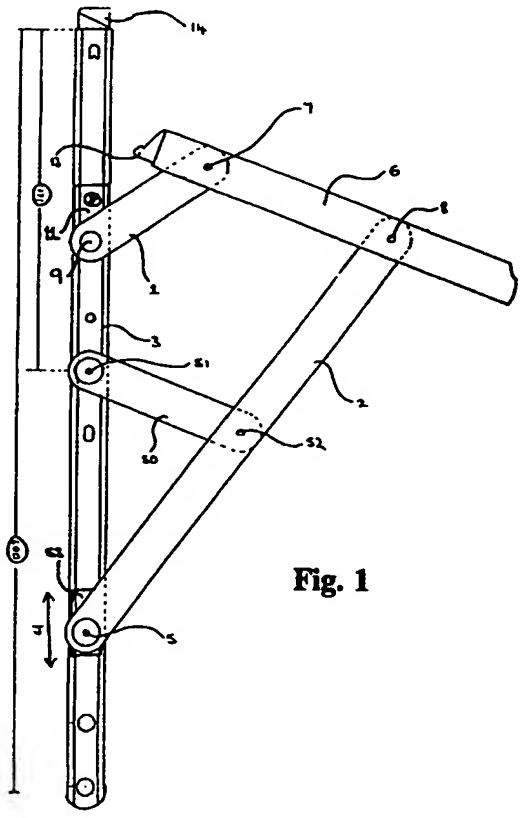

Fig. 1

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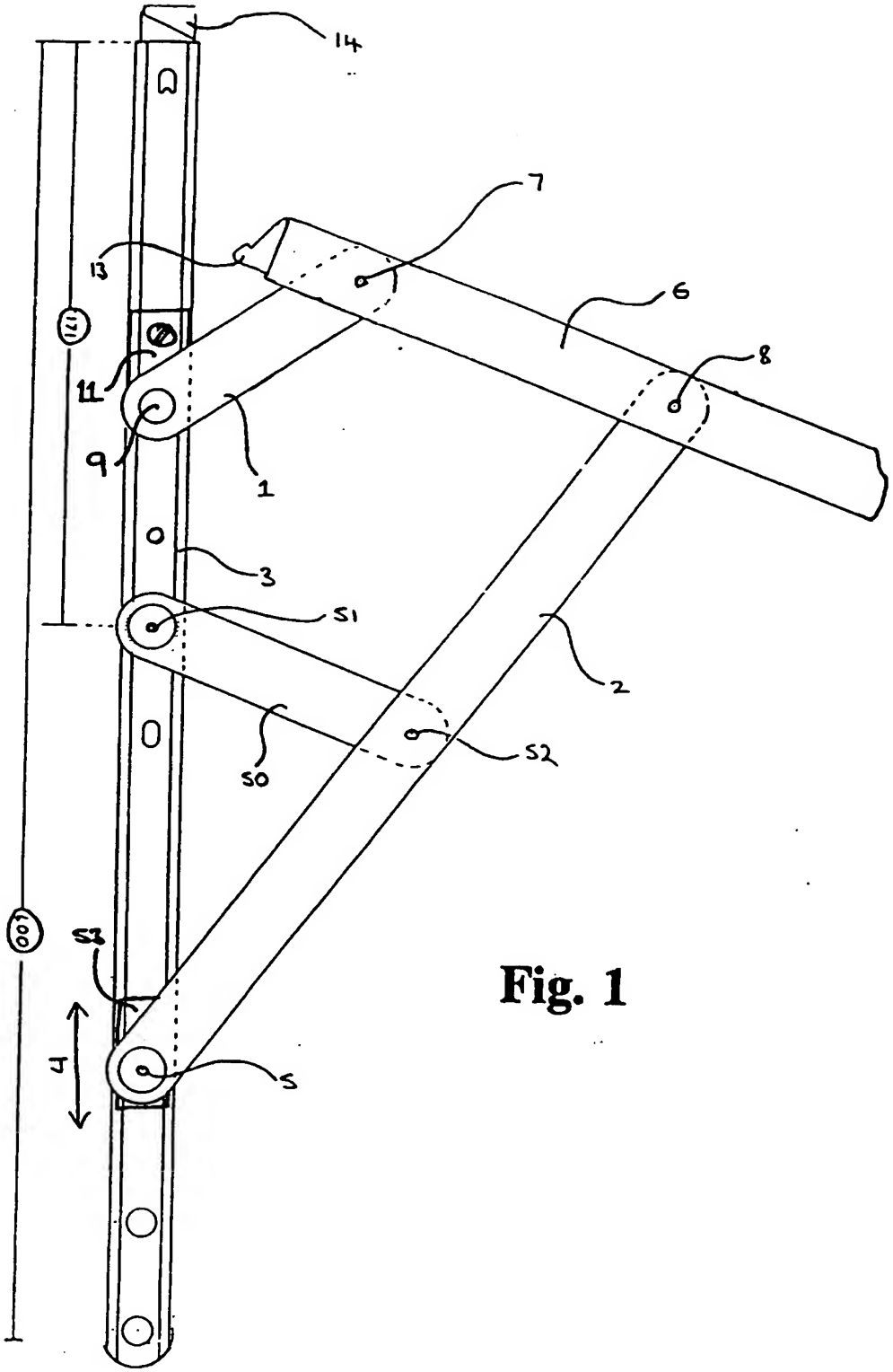

Fig. 1

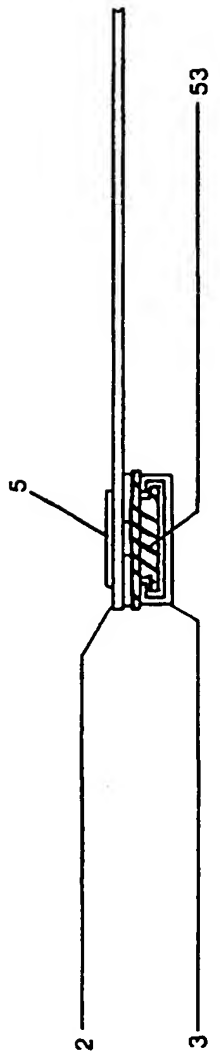

Fig. 2

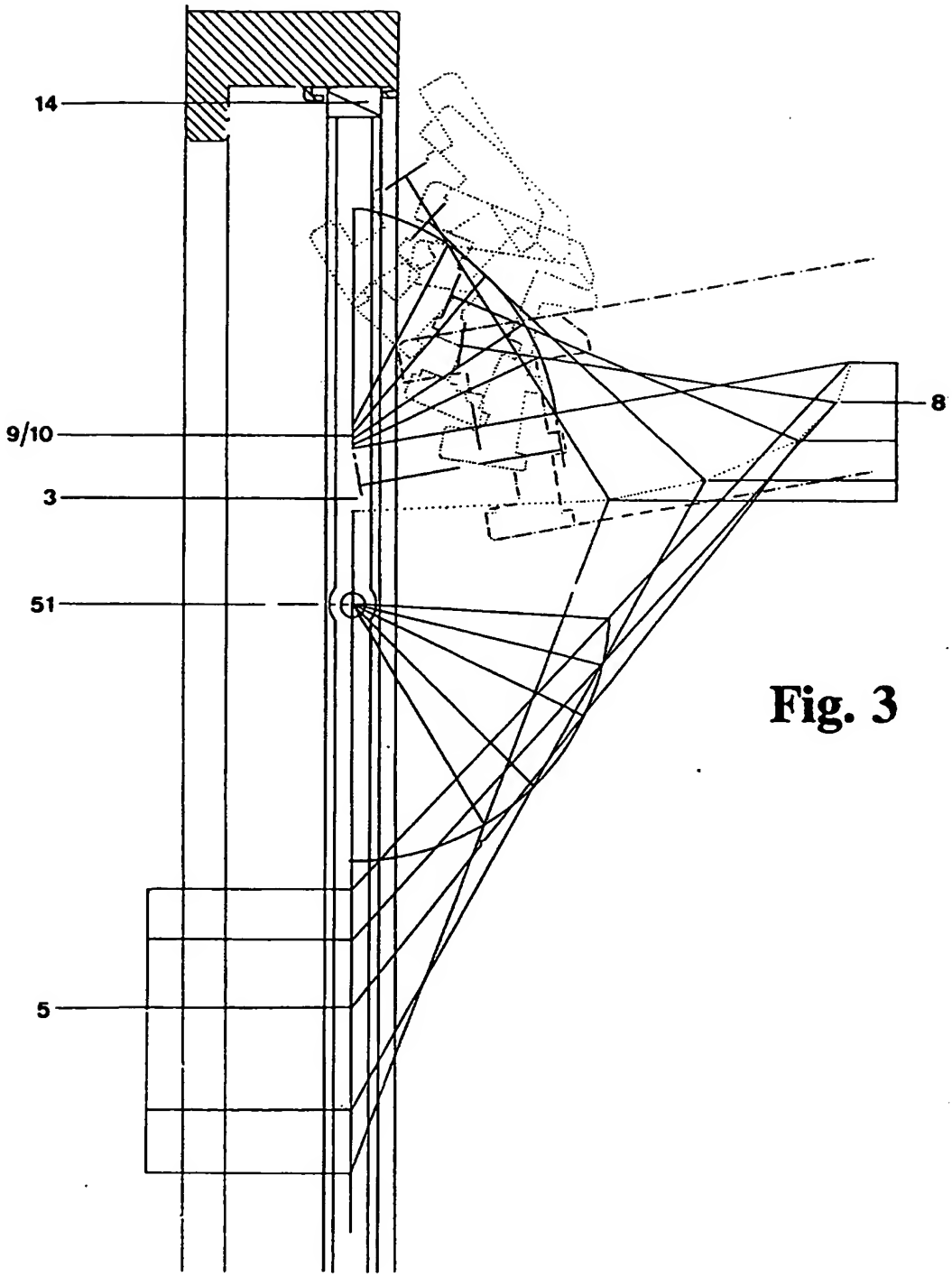

Fig. 3

Fig. 4

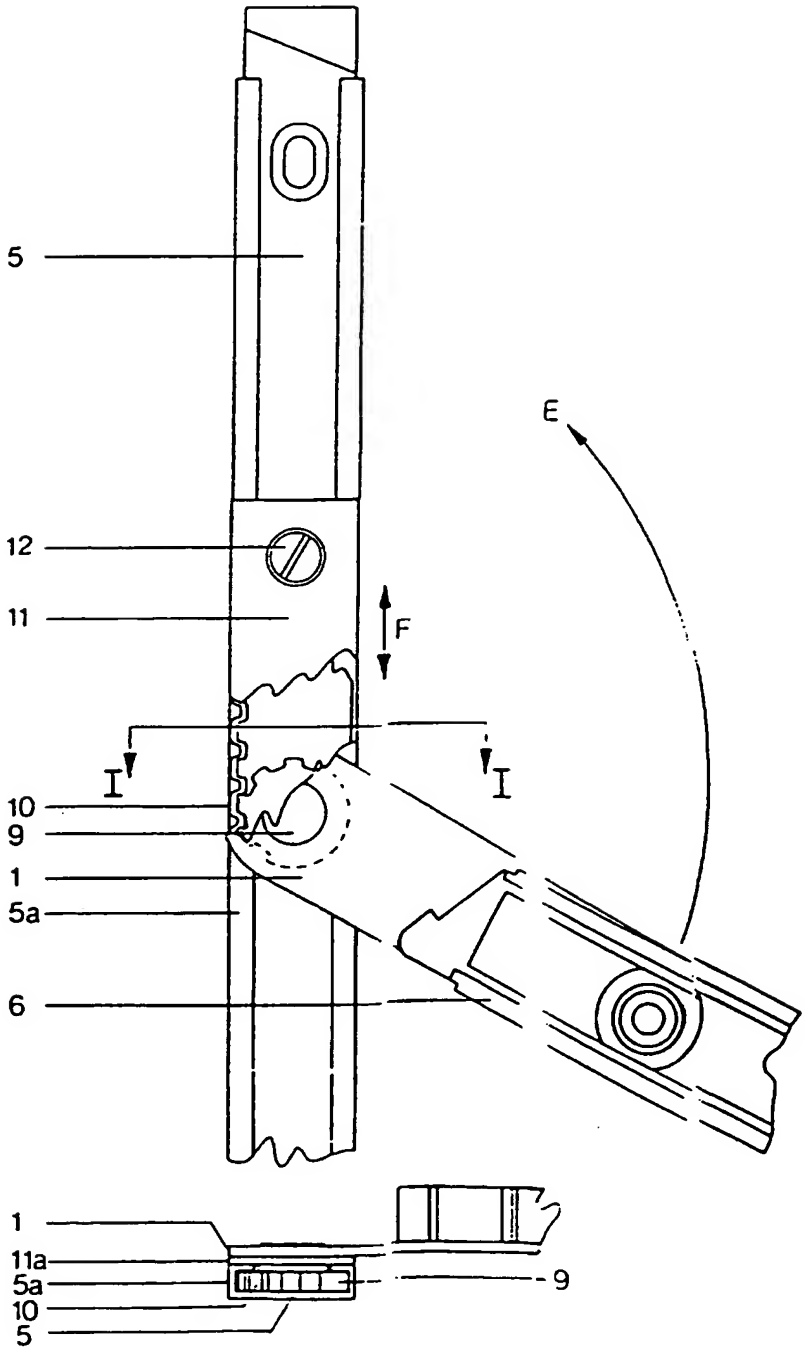

Fig. 5

FIELD OF INVENTION

My present invention comprises a friction stay for a window which allows for large angles of opening.

BACKGROUND

In many cases there is a requirement that a window be able to be opened sufficiently to allow for emergency egress of persons out of the window in the case of an emergency such as a fire for example. Persons may open the window and climb out onto the ground below the window or onto a fire escape or similar. The conventional four bar friction window stay does not allow for opening of the window sash to angles of 90° or more as are required for emergency egress.

In a window sash which is hung by simple hinges between an edge of the sash and the window frame, when the sash is fully opened substantially the whole of the window aperture is available for persons to pass through in an emergency egress situation. However with a window in which the sash is hung by friction window stays, often when the window is fully opened the top rail of the window sash partly blocks the window aperture. It is desirable in the design of any window stay which is to allow for emergency egress to maximise the part of the window aperture which is available for egress when the sash is fully opened.

There is a further requirement that for an emergency egress stay that the sash be able to be opened to about 90° or more without requiring any push buttons or other special release mechanisms of the window stay to have been first operated to allow the sash to be fully

opened. In an emergency situation it is possible that persons wishing to exit out the window may not think to operate such mechanisms.

Finally, it is also often desirable for a window sash to be able to be opened to in excess of 90°, to facilitate relatively easy cleaning of the outside surface of the window pane from the inside of the window aperture by a cleaner for example.

SUMMARY OF INVENTION

The present invention provides a window stay which goes a substantial way towards meeting all of the above requirements or which at least provides an alternative form of window stay.

In broad terms the invention comprises a friction window stay for mounting a window sash in a window frame, comprising a long arm and a pivot joint between the frame end of the long arm and a frame mounting member for securing to the frame of a window and a pivot joint between the sash end of the long arm and a sash mounting member for securing to the sash of the window, a short arm and a pivot joint between the sash end of the short arm and the sash mounting member and a pivot joint between the frame end of the short arm and the frame mounting member, the long arm-frame mounting member pivot joint being mounted for sliding or travelling movement along the frame mounting member of the window stay sufficiently to allow the stay to open to in excess of 90° between the sash and frame mounting members and a link arm pivotally connected between the frame mounting member and long arm at positions on the frame mounting member and long arm such that said link arm is not opened to an angle to the frame mounting member greater than 90° when the stay is fully opened to in excess of 90°.

Preferably the link arm is connected to the frame mounting member and long arm at positions such that the link arm is opened to an angle less than 90° when the stay is fully opened to in excess of 90°.

Preferably the pivot joint between the frame end of the short arm and the frame mounting member is a geared pivotal connection comprising a gear fixedly mounted to the frame end of the short arm engaging a rack on the frame mounting member such that during closing and opening of the stay the frame end of the short arm is moved towards and away from the head of the stay. Preferably the arrangement is such that when the window stay is fully closed the short arm and the long arm are aligned with the frame mounting member. It is not essential however that the pivot joint between the frame end of the short arm and the frame mounting member is a geared pivotal connection as referred to, and in other forms of stay of the invention the pivot joint may be a locationally fixed friction pivot joint of a type known in the art.

Preferably the stay incorporates integral means to lock the head of the stay against forced opening, comprising frame engaging means such as a protrusion on the upper end of the sash mounting member which engages sash engaging means such as a recess on the frame mounting member as the stay is closed.

The stay of my invention is suitable for use with both top hung and side hung window sashes. Particularly with forms of the stay using a geared short arm-frame mounting member pivot joint, when the window is closed the stay is also fully closed i.e. the sash mounting member and long arm are fully aligned. This allows the stay to be used with common standard uPVC

window profiles with standard cavity sizes. Also, in initial opening the head of the stay has a downward and then an outward movement. This enables the stay to employ a very effective integral head locking mechanism.

A preferred form of friction stay of the invention is illustrated, by way of example and without intending to be limiting, in the accompanying drawings, wherein:

Figure 1 is a view of a preferred form window stay of the invention from one side and partly extended or open,

Figure 2 is a cross-sectional view of the stay along line I-I of Figure 4,

Figure 3 is a schematic view of the stay of Figure 1 fitted to a window frame geometrically showing various positions between fully closed and fully opened for emergency egress and cleaning of the window,

Figure 4 is a close-up view of the short arm-frame plate joint of the stay of Figures 1 to 3 with parts cut away to show the gear and rack mechanism of the stay, and

Figure 5 is a cross-sectional view along line II-II of Figure 4.

The drawings show a preferred form window stay of the invention which comprises a short arm 1, long arm 2, frame plate 3 and sash plate 6. Pivot joints 7 and 8 which are preferably friction pivot joints are provided between the short arm 1 and sash plate 6, the long arm 2 and

sash plate 6, between the long arm 2 and frame plate 3, and between the short arm 1 and frame plate 3.

The frame end of the short arm 1 may be connected to the frame plate by either a conventional pivot joint or friction pivot joint, or as shown through a gear and rack pivotal connection particularly shown in Figures 4 and 5. A toothed gear 9 is fixed to the frame end of the short arm 1. While the gear 9 may have teeth all the way around its periphery, teeth only part way around its periphery are required. A rack 10 is formed on the frame plate 1 as shown. In the preferred form the frame plate 5 is channel shaped in cross-section, as best seen in Figure 5 (and Figure 2). The rack 10 is formed on one side of the channel shaped interior of the frame plate so that the gear 9 on the end of the short arm 1 will engage the rack 10 on the frame plate as shown in the drawings.

During opening and closing of the stay the short arm 1 will pivot around its frame end as indicated by arrow E in Figure 4. As it does so it will rotate the gear 9 which will move up and down on the rack 10, in turn effectively shifting the point at which the frame end of the short arm 1 is connected to the frame plate 5 up and down along the frame plate by a small amount as indicated by arrow F. When the stay is pulled open as shown in Figure 4, the end of the short arm 1 will be at the bottom of the rack 10 i.e. closest to the long arm-frame plate pivot joint. When the stay is fully closed, the frame end of the short arm 1 will be at the other end of the rack 10, closest to the head of the stay. As the stay is opened and closed, the gear 9 will move down and up the rack 10, moving the point of pivotal connection of the short arm 1 to the frame plate 5 as it does so.

To protect the gear-rack mechanism of the short arm-frame plate joint from dirt, a plastic cover 11 may be provided over the gear-rack mechanism. In the preferred form the plastic cover 11 is slidably mounted by grooves 11a in its sides which engage extending edges 5a of the frame plate 5 as shown in Figure 5. The gear 9 has a shaft by which it is fixed to the end of the short arm 1, which passes through a close fitting hole in the cover 11 so that the cover 11 moves in the direction of arrow F also. with the end of the upper arm 1 during opening and closing of the stay, along the frame plate. The cover 11 is preferably but optionally provided with screws 12 at one or both ends as shown which may also be formed of plastic material. By tightening these screws increased friction during opening and closing of the stay may be applied.

In the stay of the invention the pivot joint 5 between the long arm 2 and frame plate 3 is a sliding or travelling pivot joint which allows for movement of the joint along the frame plate 3 in the direction of arrow J as shown. The pivot joint 5 connects the end of the long arm 2 to a slide component 53 captive on the channel shaped frame plate 3 by the longitudinal edges of the frame plate engaging into grooves on the sides of the slide 53 (see Figure 2). The slide 53 is preferably formed of plastic.

In addition, a link arm 50 is provided between the frame plate 3 and long arm 2 as shown. The third arm 50 is connected to the frame plate 3 by a pivot joint 51 which may be a friction pivot joint and to the long arm 2 by a pivot joint 52.

The pivot joint 51 between the link arm 50 and frame plate 3 is fixed, while as stated the pivot joint 5 between the long arm 2 and frame plate 3 allows for sliding movement. In

Figure 1 the stay is shown open to a large extent (but not fully open). In closing of the stay, the closing movement of the long arm 2 towards the frame plate 3 will also be accompanied by a sliding movement of the sliding long arm-frame plate pivot joint 3 away from the pivot joint 51 (downward sliding movement in the case of an awning hung sash). Similarly, in opening movement of the stay movement of the long arm 2 away from the frame plate 3 will be accompanied by movement of the sliding long arm-frame plate pivot joint 3 towards the pivot joint 51 (upward movement in the case of an awning hung window sash). In opening and closing of the stay the third arm 50 will pivot about the pivot joint 51 guiding sliding movement of the end of the long arm 2.

The degree of sliding movement of the long arm/frame plate pivot joint 3 along the frame plate 3 is sufficient to allow the stay to open to an angle in excess of 90° between the sash plate 6 and the frame plate 3, and preferably of the order of 110° for example. At the same time, the link arm 50 is connected at positions on the long arm 2 and frame plate 3 that when the window stay is open to its fullest extent, so that the sash plate 6 extends at an angle in excess of 90° and up to 110° or more as referred to relative to the frame plate 3, the link arm 50 is not open to an angle above 90° relative to the frame plate 3, and preferably is opened to an angle less than 90°. This provides for reliable opening and closing movement of the stay and arms thereof.

With the stay of the invention the stay can open to angles in excess of 90° and up to 110° for example. At the same time because the long arm-frame plate pivot joint 5 is slidably mounted, it moves up reducing the movement of the top of the window sash downwards to block the window frame aperture when the window is fully opened. Figure 3

schematically/geometrically shows various positions of opening of the window stay between closed and fully opened. The head of a sash carried by the stay is shown in dotted outline at various positions, and in chain outline in the position when the sash is opened to its fullest extent, from which it can be seen that the window stay allows for the window sash to be opened to angles in excess of 90°. In Figure 3 the arms of the window stay and the sash plate 6 are not shown but are each represented by lines at various positions indicating various positions of such arms and the sash plate 6 at various degrees of opening of the stay. In Figure 3 the arrows from reference numeral 8 show the various positions of the pivot joint 8 between the long arm 2 and the sash plate 6 at various degrees of opening of the window stay and the arrows from reference numeral 5 similarly indicate the various positions of the pivot joint 5 between the long arm 2 and the frame plate 3 as the pivot joint slides up the frame plate as the stay is opened increasingly. From a study of Figure 3 the action of the stay can be seen, showing that the sliding action of the pivot joint 5 allows for the point 8, to move through an upward arc, and the sash to swing open to an angle in excess of 90°.

In Figures 1 and 3 the circled numbers are dimensions for the length of various components, which are given by way of example only. Matching dimensions for the long arm, short arm and link arm are 250mm, 70mm and 83mm respectively.

Stays of the invention preferably incorporate a preferred form of head locking mechanism as will now be described. The top end of the sash plate 6 is formed with frame engaging means in the form of a protrusion 13. A recess 14 is formed in an integral enlarged head 15 of the frame plate 5. The protrusion 13 and recess 14 each have an adjacent downwardly sloping land 13a and 14a as shown. The arrangement is such that when the window stay is closed,

the sash plate 6 will move such that the protrusion 13 engages into the recess 14. When the stay is fully closed and the protrusion 13 is fully engaged into the recess 14, the head of the window is locked and cannot be opened by force or prising open between the top of the window sash and the window frame. The locking mechanism can again only be opened by proper opening of the window by pushing on the bottom of the sash from within.

In the preferred form stay of the invention described above the pivot joint between the frame end of the short arm 1 and the frame plate 3 is a geared pivot joint as described, but alternatively it may comprise a locationally fixed pivot joint of a type similar to the other pivot joints of the stay and it is not essential that the joint be a geared pivot joint. Thus the stay may be an otherwise conventional four bar stay in which the pivot joint between the long arm and the frame mounting member is mounted for sliding or travelling movement and a link arm is provided between the frame mounting member and the long arm as described, to enable an otherwise conventional four bar stay to open to in excess of 190° and preferably up to 110° or more.

The foregoing describes the window stay of my invention. Alterations and modifications as will be obvious to those skilled in the art are intended to be incorporated in the scope hereof.

CLAIMS

1. A friction window stay for mounting a window sash in a window frame, comprising a long arm and a pivot joint between the frame end of the long arm and a frame mounting member for securing to the frame of a window and a pivot joint between the sash end of the long arm and a sash mounting member for securing to the sash of the window, a short arm and a pivot joint between the sash end of the short arm and the sash mounting member and a pivot joint between the frame end of the short arm and the frame mounting member, the long arm-frame mounting member pivot joint being mounted for sliding or travelling movement along the frame mounting member of the window stay sufficiently to allow the stay to open to in excess of 90° between the sash and frame mounting members and a link arm pivotally connected between the frame mounting member and long arm at positions on the frame mounting member and long arm such that said link arm is not opened to an angle to the frame mounting member greater than 90° when the stay is fully opened to in excess of 90°.

2. A window stay according to claim 1, wherein the link arm is connected to the frame mounting member and long arm at positions such that the link arm is opened to an angle less than 90° when the stay is fully opened to in excess of 90°.

3. A window stay according to either one of claims 1 and 2, wherein the long arm -frame mounting member pivot joint may slide or travel sufficiently to allow the stay to open to 110° between the sash and frame mounting members or more.

4. A window stay according to any one of the preceding claims, wherein the pivot joint between the frame end of the short arm and the frame mounting member is a geared pivotal connection comprising a gear fixedly mounted to the frame end of the short arm engaging a rack on the frame mounting member such that during closing and opening of the stay the frame end of the short arm is moved towards and away from the head of the stay.

5. A window stay according to any one of the preceding claims wherein the stay incorporates integral means to lock the head of the stay against forced opening, comprising frame engaging means on the upper end of the sash mounting member which engages sash engaging means on the frame mounting member as the stay is closed.

6. A window stay substantially as herein described with reference to any one or more of the accompanying drawings.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report)	Application number GB 9518868.6
Relevant Technical Fields (i) UK Cl (Ed.N) E2F (FSG) (ii) Int Cl (Ed.6) E05D (15/3, 15/44)	Search Examiner MRS GILL WHITFIELD Date of completion of Search 2 NOVEMBER 1995
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) ONLINE: WPI	Documents considered relevant following a search in respect of Claims :- 1-6

Categories of documents

X:	Document indicating lack of novelty or of inventive step.	P:	Document published on or after the declared priority date but before the filing date of the present application.
Y:	Document indicating lack of inventive step if combined with one or more other documents of the same category.	E:	Patent document published on or after, but with priority date earlier than, the filing date of the present application.
A:	Document indicating technological background and/or state of the art.	&:	Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
Y	WO 94/21879 A1	(DAVIS) see especially Figure 4	4, 5
X,Y	US 4555829 A	(DAVIS) see especially Figure 1	X: 1-3 Y: 4, 5

Databases:The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

DERWENT-ACC-NO: 1996-153270

DERWENT-WEEK: 199748

TITLE: Friction stay for window sash - has four bar stay with long and short arms having frame member for securing to sash and pivot joint providing sliding movement along frame mounting member

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PATENT-ASSIGNEE: DAVIS R P[DAVII]

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PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
GB 2293411 A	March 27, 1996	N/A	017	E05D 015/44
GB 2293411 B	November 12, 1997	N/A	000	E05D 015/44
NZ 260959 A	February 24, 1997	N/A	000	E05C 017/02

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
GB 2293411A	N/A	1995GB-0018868	September 15, 1995
GB 2293411B	N/A	1995GB-0018868	September 15, 1995
NZ 260959A	N/A	1994NZ-0260959	September 18, 1994

INT-CL (IPC): E05C017/02, E05D015/30 , E05D015/44

ABSTRACTED-PUB-NO: GB 2293411A

BASIC-ABSTRACT:

A four bar friction window stay, has a long arm (2), a short arm (1), a frame mounting member (3) for securing to the frame of a window and a sash mounting member (6) for securing to the sash of the window. The long arm-frame mounting member pivot joint (5) is mounted for sliding or travelling movement along the frame mounting member (3) sufficiently to allow the stay to open to in excess of (90) degrees between the sash and frame mounting members.

A link arm (1) is pivotally connected between the frame mounting member (3) and long arm (2) at positions on the frame mounting member and long arm such that the link arm is not opened to an angle to the frame mounting member greater than (90) degrees when the stay is fully opened to in excess of (90) degrees.
The pivot joint between the short arm (1) and member (3) may be a geared pivotal connection.

ADVANTAGE - Allows sash to be opened over 90 degrees, so it can be cleaned easily on both outside and inside from inside the window aperture.

ABSTRACTED-PUB-NO: GB 2293411B

EQUIVALENT-ABSTRACTS:

A friction window stay for mounting a window sash in a window frame, comprising a long arm and a pivot joint between the frame end of the long arm and a frame

mounting member for securing to the frame of a window and a pivot joint between
the sash end of the long arm and a sash mounting member for securing to the
sash of the window, a short arm and a pivot joint between the sash end of the
short arm and the sash mounting member and a pivot joint between the frame end
of the short arm and the frame mounting member, the long arm-frame mounting
member pivot joint being mounted for sliding or travelling movement along the
frame mounting member of the window stay sufficiently to allow the stay to open
to in excess of 90 deg. between the sash and frame mounting members and a link
arm pivotally connected between the frame mounting member and a long arm at
positions on the frame mounting member and a long arm such that said link arm
is not opened to an angle to the frame mounting member greater than 90 deg.
when the stay is fully opened to in excess of 90 deg. .

CHOSEN-DRAWING: Dwg.1/5 Dwg.1

TITLE-TERMS: FRICTION STAY WINDOW SASH FOUR BAR STAY LONG SHORT ARM FRAME
MEMBER SECURE SASH PIVOT JOINT SLIDE MOVEMENT FRAME MOUNT MEMBER

DERWENT-CLASS: Q47

SECONDARY-ACC-NO:
Non-CPI Secondary Accession Numbers: N1996-128739